Age estimation and reproductive status of an exceptionally large blue-eye trevalla (*Hyperoglyphe antarctica*, Centrolophidae) captured off the south coast of Western Australia

by

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ABSTRACT. - In March 2005, an exceptionally large blue-eye trevalla, *Hyperoglyphe antarctica* (Carmichael, 1819), was captured by drop line off the south coast of Western Australia. The specimen measured 1066 mm total length, 968 mm fork length, was female and in spawning condition (hydrated oocytes were present). The sagitta was used to estimate an age of approximately 32 years. This specimen is one of the largest and oldest reported for this species and also contributes towards the knowledge of the reproductive biology of this species, which has not been investigated in Western Australia.

RÉSUMÉ. - Estimation de l'âge et du statut reproducteur d'un individu exceptionnellement grand de *Hyperoglyphe antarctica* (Centrolophidae) capturé sur la côte sud de l'Australie occidentale.

En mars 2005, un individu exceptionnellement grand de *Hyperoglyphe antarctica* (Carmichael, 1819) a été capturé à la ligne sur la côte sud de l'Australie Occidentale. Ce spécimen qui mesurait 1066 mm de longueur totale pour 968 mm de longueur à la fourche, était une femelle prête à frayer (des oocytes hydratés étaient présents). La sagitta a été utilisée pour estimer un âge d'environ 32 ans. Cet exemplaire est un des plus grands et plus vieux de cette espèce et contribue aussi à une meilleure connaissance de la biologie reproductrice de l'espèce, laquelle n'a pas été étudiée en Australie Occidentale.

Key words. - Centrolophidae - *Hyperoglyphe antarctica* - Age - Otolith - Reproduction.

The blue-eye trevalla, *Hyperoglyphe Antarctica* (Carmichael, 1819), is widely distributed throughout the southern oceans and commonly occurs near continental slopes in depths of *ca* 100 to 600 m off New Zealand, southern Australia, South Africa and Tristan da Cunha (Duffy *et al.*, 2000). This species is of significant commercial importance throughout its distribution. Commercial landings in New Zealand averaged *ca* 242 t annually between 1978 and 1986 (Horn and Massey, 1989), and in south-eastern Australia were *ca* 800 t in 1993 (Bolch *et al.*, 1993). In comparison, the commercial catches in Western Australia are much lower, averaging a mere 3.2 and 7.4 t annually for the west and south coast fisheries, respectively, between 1992 and 2006. Prior to 1992 this species was virtually unfished in Western Australia (derived from compulsory catch statistics provided by commercial fishers to the Department of Fisheries, Government of Western Australia).

Developing fisheries tend to selectively remove the largest individuals in the population due to their greater behavioural vulnerability (Jennings *et al.,* 1999; Law, 2000). As such, given that *H. antarctica* have only been commercially targeted in Western Australian waters in recent years and catches are still relatively small, and currently there is no knowledge available in relation to the biology of this species from these waters, it thus becomes very important to report the biological characteristics of exceptionally large individuals.

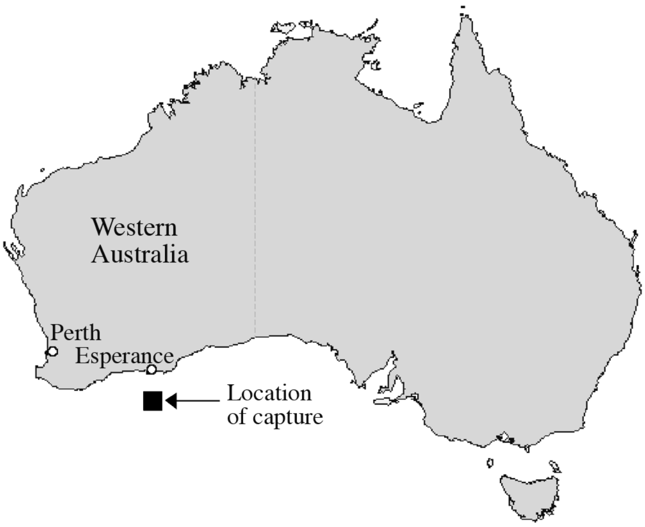

Figure 1. - Map showing the approximate location in south-western Australia where the *H. antarctica* specimen was captured. *[Carte montrant la zone approximative de capture du spécimen de* H. antarctica.*]*

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MATERIAL AND METHODS

The specimen was captured on 30 March 2005 by a commercial fisher using a drop line in a depth of *ca* 300 m, on the continental slope south of Esperance, on the south coast of Western Australia (Fig. 1). The fillets were removed from the fish by the commercial fisher and the remaining carcass was sent to the laboratories of the Research Division at the Department of Fisheries. The fish was measured, sexed and the sagittae were extracted. The right otolith was later

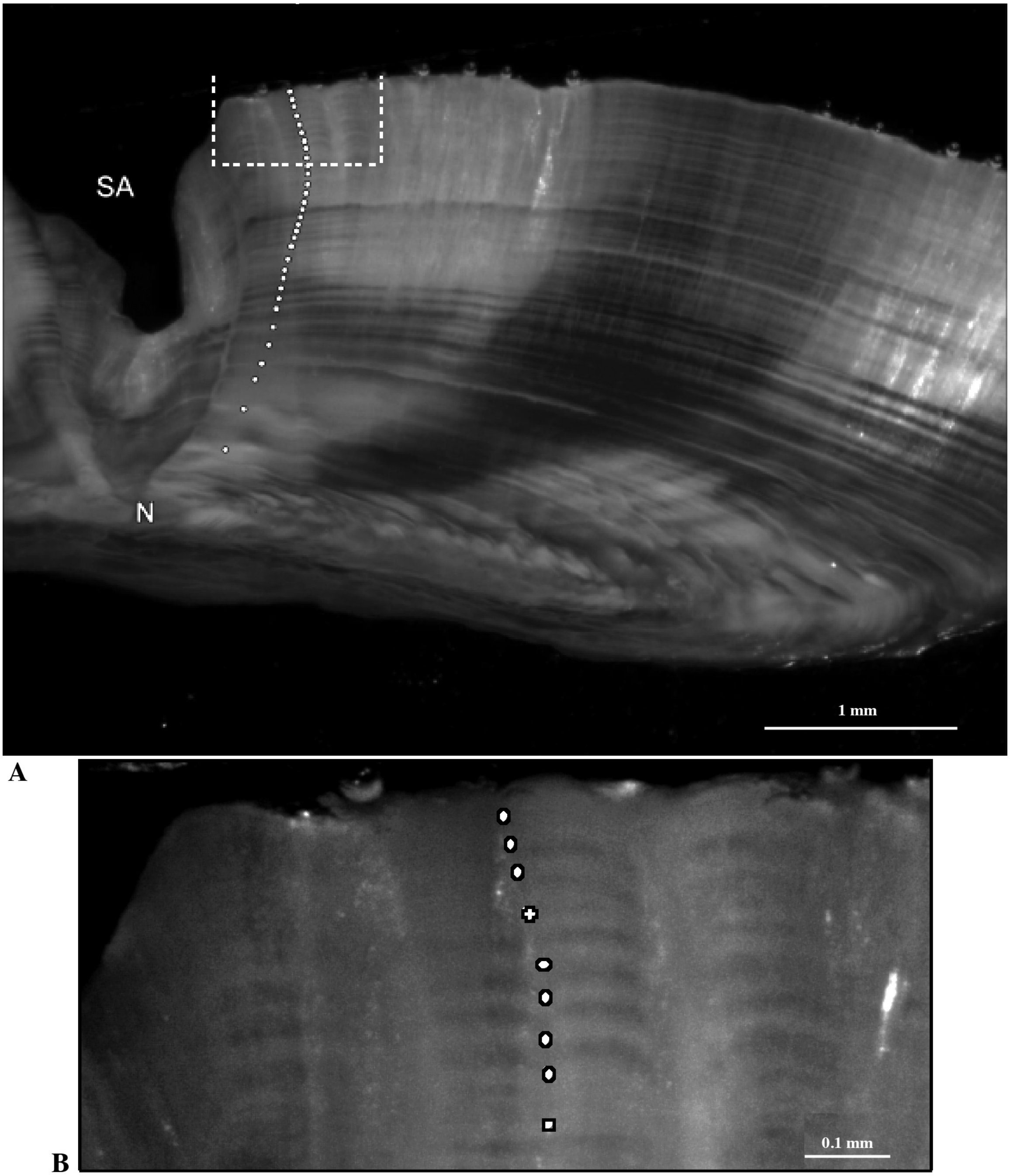

Figure 2. - **A**: Transverse section of the right sagitta with 32 opaque zones. **B**: High magnification of the region boxed in A showing those opaque zones that occur near the proximal edge of the sagitta that are close together. White circles, opaque zones; SA, sulcus acusticus; N, primordium. *[**A** : Section transversale de la sagitta droite montrant 32 zones opaques. **B** : Agrandissement de la région encadrée en A montrant les zones opaques situées près du bord proximal de la sagitta qui sont très resserrées. Cercles blancs : zones opaques ; SA : sulcus acusticus ; N : primordium.]*

embedded in epoxy resin and, using a slow speed saw (Buehler Ltd) with a diamond tipped saw blade, sectioned transversely through its primordium, perpendicular to the sulcus acusticus. The otolith section was 276 µm thick. The section was mounted on a glass slide with a cover slip using casting resin. The opaque zones were counted along an axis close to the sulcus acusticus on the ventral side (Fig. 2), under reflected light by both authors, separately.

RESULTS

The *Hyperoglyphe antarctica* specimen measured 1066 mm total length and 968 mm fork length. The sex of the fish was female and hydrated oocytes were visible in the ovaries. The combined weight of the two ovaries was 1956.5 g. The transverse section of the sagitta displayed relatively clear opaque and translucent zones (Fig. 2), with both authors counting a total of 32 opaque zones.

DISCUSSION

The *Hyperoglyphe antarctica* specimen described in this study is one of the largest reported in the literature to date. Previous studies of age and growth of this species have shown that females grow to a larger size than males (Horn, 1988; Morison and Robertson, 1995a). The largest lengths of females from such studies include *ca* 750 mm TL in Tasmania (Webb, 1979), *ca* 790 mm FL from the north-east coast of New Zealand (Horn, 2003), *ca* 950 mm FL from the lower east coast of the North island of New Zealand (Horn, 1988) and 1050 mm FL in Victoria (Morison and Robertson, 1995a, 1995b). Many studies of *H. antarctica* have not included samples of large individuals, *i.e.* fork lengths > 850 mm. For example, the largest individuals from Webb (1979) were *ca* 750 mm FL, although individuals as large as 1.4 m were reported prior to his research. Horn and Massey (1989) sampled few fish larger than 800 mm FL, and all samples from Horn (2003) were smaller than 790 mm FL.

A single opaque zone has been found to form on the sagittae of *H. antarctica* each year (Horn, 1988; Morison and Robertson, 1995b). Thus, the number of opaque zones in the otoliths of this species can be used for assessing the age of individual fish. Given this, the specimen described in this study is over 32 years of age. In comparison, the two largest females aged, from Morison and Robertson (1050 mm FL, 1995b) and Horn (950 mm FL, 1988), were similar in size to the one from this study but significantly younger, *i.e.* 21 and 11 years, respectively. However, Morison and Robertson (1995b) also identified approximately four older individuals of up to 42 years of age. Maximum reported ages from other studies include 9 (Webb 1979) and 16.8 years (Horn and Massey, 1989). The age of 32 years reported for this specimen of *H. antarctica* indicates that large female fish can be very old. Fish from the same genus, *Hyperoglyphe perciformis* (Mitchill 1818), have been aged as old as 85 years (Filer and Sedberry, 2008).

The specimen from this study was found to be in spawning condition (hydrated oocytes were present in the ovaries) in early autumn (March). Currently, there is little information available on the reproductive biology of *H. antarctica*. Horn and Massey (1989) found *H. antarctica* from the lower east coast of the north island of New Zealand to spawn over several months, commencing in late summer (December). In Tasmania, gonad maturation in *H. antarctica* was found to occur from spring to summer (October to February) with a brief spawning period in Autumn (March to early May, Baelde, 1996). The timing of spawning in Tasmania is consistent with the specimen from this study. However, given the higher latitude in Western Australia and thus corresponding water temperatures, the reproductive biology of this species needs further investigation in these waters.

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